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12p.

NASA TMX-51711

N65-83833

Code Vone

THE NASA PROGRAM FOR STIMULATING INDUSTRIAL UTILIZATION OF GOVERNMENT-SPONSORED TECHNOLOGY

by

James T. Dennison
Special Assistant for Technology Utilization
Office of Technology Utilization and Policy Planning
National Aeronautics and Space Administration

at the briefing conference on
National Patent Policies and Practices
Sponsored by the
Federal Bar Association and the
Government Patent Lawyers Association

April 27, 1964
Los Angeles, California

during afternoon session on
Procedures Promoting Industrial Utilization of
Inventions, Patents and Technology Resulting from
Government-Sponsored Research and Development

J. T. Dennison AT-1 June 19, 1964

The underlying objective of any research and development effort is to have its results contribute to Man's struggle against Nature; to add to the store of man's useful and used knowledge; to raise the general standard of living of the human species.

The mere production of new knowledge by an R&D endeavor does not automatically achieve the foregoing objectives. This new knowledge must be put to work in some manner or other, such as in the evoking of economic growth, before it attains real value. This statement is binding upon whomever produces such knowledge, whether it be universities, industry, monasteries, government, the hermit inventor, or a charitable foundation. In merely discovering new knowledge you have done nothing; and no one except your own pride will be the better for it until that knowledge is gainfully employed. This knowledge, this potent source of energy, of mastery, and of comfort - this self-reproducing, chain-reacting intellectual stuff - does no one any good sheltered in a patent file, or in an engineer's notebook, or in a scientist's head, or under a laboratory bench. It

must come out of the murky garret where it was born and expose itself to the harsh bright sunlight of our world. When it learns to stand the glare and to convert itself into a better pair of sunglasses, only then does it become something that posterity will praise.

Part of the above essay rests on one unsubstantiated hypothesis - that research and development programs do indeed produce employable information. Is this true of all such programs? Certainly not. Is it true of some of them? Yes, of course. Are huge federally-financed R&D programs among those that do produce employable information? They ought to be. Does NASA? We believe so, and the agency has diligently set about to prove that belief.

How does any self-respecting research and development enterprise go about establishing as a fact that its activities generate economically valuable information? First that enterprise encourages the producers of the knowledge to exploit it to its fullest extent - not just for its own particular operations nor privately for its own stockholders, but "to the fullest extent" for the Nation at large.

The second step is to gather all that material that

is not being fully exploited by its producer or by someone else - gather it and out of it extract and discover the bits and pieces, the intended results, the discarded projects, the indirect effects and the unsuccessful attempts. Collect this merchandise and lay it on the counters for all to see and some to buy. And be sure that it is attractively packaged; that it is easily accessible in clearly recognizable departments; that there is something for every class and kind of consumer; and that it will entrap the impulse buyer.

Later, having either persuaded the knowledge-producer to commercialize it, or having set it on the edge of the stream of commerce, the R&D enterprise must be prepared to assess the validity of its confidence that those who acquire its goods will prosecute their new-found knowledge, will make it of economic value and will get a return on their investment.

Some think that the engineer or scientist or inventor himself, the producer of the knowledge, is the best one to extract the maximum of economic benefit therefrom. So why bother with the second step just enumerated of accumulating an inventory, merchandising it and putting it on sale? We

should examine these producers and see if, in fact, they be qualified exploiters of practical know-how. They are universities, research institutes, private consultants, industrial laboratories, residents of ivory towers, R&D charlatans and - the least qualified of all - government laboratories. Shall we rely entirely on these characters to succeed in the business of developing intellectual commodities for the public good? Certainly for some degrees of knowledge, parts of this gallery of producers are the only ones who can make head or tail of it. For the erudite knowledge produced by the scientist, the only one who can refine it, so that it eventually will accrue to human happiness, is another scientist, perhaps with slightly shorter hair. For some kinds of knowledge, the kinds that need further processing before they can be exposed to the consumer's preference, the best and only ones who can rework it and toughen it for this exposure are scientists and research engineers.

But <u>technology</u>, which includes applied science, most inventions and patents, should be in the hands of entrepreneurs, of industry, commerce and business. It

should be made accessible to the manager who has a job to get done. We shall concentrate for the rest of this talk on the technology end of the information spectrum. Is it still argued that the creator or inventor or government researcher who produced this innovation is the best one to capitalize on his new-found technical know-how? Is the company whose business is underwater sound devices competent to commercialize a new hearing aid? Generally that is not the case. Then surely it is up to the organization who financed that new hearing-aid technology to transmit it to those who can capitalize on it.

This is then the fundamental reason-for-being of a Technology Utilization program. Whether it is run by NASA, by private industry, by a university, by an aerospace company or by any government agency - it is to communicate to and to transfer to those who can use them the selected bits of knowledge that are generated in its research and development activity.

Going back to our retail or supermarket analogy: before our intellectual goods can be transmitted or shipped - that is, before an R&D enterprise can stimulate the

consumption and utilization of its goods - we must receive, collect and warehouse such goods. So the information-merchandising group within any research and development establishment says to those producing the knowledge - tell us what you have found and report it to us, so that we can appraise its commercial potential and repackage it for distribution.

If after the merchandising people say this, very little is being passed on to them by their factories, it means either that NASA's (and other people's) belief is wrong, and no new and fruitful knowledge is emanating from our R&D factories; or that the producers of that knowledge are holding it back on the basis that it is more valuable to them than to the merchandising group; or perhaps that the message has not yet reached the busy R&D folk, and they don't know that someone badly wants their output of technology.

Enough of this handy and very pertinent allegory. .... To put across the message to NASA's R&D factories that they are to produce and to deliver to NASA all of their intended and incidental knowledge, a contractual obligation

was promulgated in November, 1962, requesting, or perhaps directing, those factories to identify and report their technological products. The message was refined, reworded and rebroadcast in October, 1963, under the title of "New Technology Clause." That clause says, in effect - reveal what you have learned or innovated or discovered or improved or invented while performing research and development on behalf of NASA; then NASA will pass this merchandise on to its distributing organizations so that it will get the maximum publicity and (not quite Q.E.D.) the maximum utilization.

Let us assume for the moment that NASA's message has reached or is on its way to heeding ears. Yet there is still only the merest trickle of goods coming into our receiving room! Could it be that the other reasons just listed are responsible? - either that no useful information is arising from the vast amount of research and development being performed for NASA, or that what new knowledge is being created is being intentionally, or unwittingly, withheld? To settle the matter let us investigate whether there is any evidence that similar R&D programs do produce

anything of value.

For this investigation we shall confine ourselves to invention disclosures. Though the information that a Technology Utilization program wants to publicize for all to use - this technological raw material - is not so much patentable subject matter as it is non-patentable subject matter, such as innovations, refinements, tools, techniques and advances in the state-of-the-art, we shall for the purposes of this investigation give our attention first to invention disclosures, as the term is understood throughout the trade. We recognize that not all such disclosures, perhaps only 25% of them, prove to be patentable; that all are potentially useful; and that few are trivial. Do we have some evidence that research and development programs of some kind or another do produce worthwhile new knowledge of the invention disclosure variety? Such evidence is indeed available. A survey of a number of large, non-aerospace, commercial corporations who perform a great deal of research and development for themselves and for the government reveals information from which a measure of the rate of

invention disclosures can be derived. A factor can be established which is directly related to the number of inventions disclosed by personnel to their own corporations, either for that corporation's own use or for transmittal to the sponsoring government agency. Then this same factor can be calculated for any number of aerospace companies whose business is mostly with the Department of Defense, with NASA and, perhaps, with the FAA. The shocking fact is that the invention disclosure rate of the aerospace companies is only 5% to 10% that of the large R&D-conducting corporations who are primarily commercially-oriented. We will say that another way for emphasis. On roughly equivalent kinds and volumes of research and development operations, less that 1/10th as many inventions are disclosed to aerospace companies as to companies in the non-aerospace categories.

This evidence confirms the belief that was enunciated earlier in this discourse on which NASA bases it case - that research and development can generate new knowledge. This evidence shows that commercially-oriented companies in their R&D programs do produce and do record a respectable

volume of useful new technology. Could it be that the same kind of research and development done primarily on federal funds for aerospace purposes should decrease the volume of useful new knowledge produced by 90% to 95%? We doubt it. That beneficial new technology is there. Let's all of us resolve to bring it out into the open and make the most of its potential.

It would be easy to list a dozen causes for such a low response to NASA's message from its aerospace contractors. Each one of these causes would be more of an excuse than a natural law, more of a complaint than a reason. The need now is not to take shelter behind supposed differences that could apply to the aerospace industry. The need is to set about at once to prove that aerospace R&D can generate nearly as much useful technology as commercial research programs.

This conference's agenda implies that NASA does have a "program for stimulating industrial utilization of government-sponsored technology." That is more than an implication, it is a fact. It is an active, forthright, well-reasoned, even a good program. But much of the raw-material-wherewithal essential for such "stimulation" is

nestling shyly in the R&D confines of the aerospace industry. Unless the aerospace industry unveils and communicates that wherewithal to its merchandisers, then that technology will not be utilized; it will not be put to doing the world's work; it will not be a national resource for economic growth. If that happens, those millions of us who believe in and are dependent upon the R&D industry will be forced to admit that our industry is unproductive, uneconomic and unworthy of further public subsidy.

To make our research and development enterprises survive, we must carry out some hardheaded waste-elimination, by-product-utilization and cost-reduction programs. When our corporate aerospace consciences are satisfied that every last morsel of knowledge in the R&D pig is being ground into spiced meat or refined into gelatin, then we will have accomplished the "industrial utilization of government-sponsored technology;" we will have achieved a secure economic niche for us R&D producers; and we as tax-payers will have earned our money's worth.